Linear propagation of light is the tendency of light to travel in straight lines. Light has two basic properties: it travels at a constant speed, and it always travels in a straight line if the medium is uniform. Light is not refracted when it passes through a medium that has the same overall refractive index, but it is refracted when it passes through a medium that does not. Snell's law is an important physical law that describes the refraction that occurs when light passes through the boundary of two different media. The law accurately describes the relationship between the angle of refraction of light and the index of refraction of each medium, making it possible to predict how light will be refracted when it enters another medium. The linear propagation of light and Snell's law are important tools for understanding and studying optical phenomena.

Geometric Optics Physically Informed Neural Networks (GONNs) is a deep learning artificial neural network solution for solving forward and backward problems in geometric optics by utilizing physically informed neural networks (PINNs). First, set the initial position value of the ray and use it to obtain the direction vector value, and then combine them to generate input data. Create a model that receives the previously generated input data as input values and whose output value is the intersection prediction time () of the rays. The structure of the model consists of two hidden layers with 10 neurons each and uses the ReLU function as the activation function. The loss function has two loss values. The first is the loss at the intersection of the ray and the lens. This is the loss value obtained by using the predicted intersection time to find the coordinates of the point where the light ray intersects the lens and substituting them into the lens (where are the lens center coordinates). The second loss value is the loss value when the direction vector of the light is negative, since light travels in a straight line when passing through a uniform medium by linear propagation of light. A loss function is defined using the mean square error (MSE) for each loss value and is trained via gradient descent with learnable weights to minimize the loss function value. Finally, the with the minimum loss function value can be utilized in various light relations to predict and solve various forward and backward problems in geometric optical phenomena.